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SPONDYLOLYSIS AS A CAUSATIVE FACTOR OF LOW BACK PAIN IN ATHLETES

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SUMMARY

The purpose of this study was to investigate the etiology of low back pain (LBP) - and its differentiation, in athletes who participate in football or table tennis, and to compare them with non-athletes suffering from LBP. For the realization of the research, 90 subjects (mean age of 19.4 yrs) with LBP were selected, and they were separated in three groups (table tennis players, football players and non-athletes) of 30 each. It was observed that the main causative factor of LBP appearance in table tennis players was spondylolysis (60 %). Similar radiological findings were observed in football players (30 %). Only two non-athletes (6.7 %) were found to have spondylolysis. It was observed that football players had shorter reactivation periods. Symptoms were different for table tennis (repeated and progressive symptoms) and football (acute appearance of symptoms) players. The present study tries to link the appearance of LBP in athletes to injuries related to the nature of the sport practiced.

Key words: Low back pain, spondylolysis, table tennis, football, exercise

ÖZET

SPORCULARDA AŞAĞI BEL AĞRISINA NEDEN OLARAK SPONDİLOLİZİS

Bu çalışmanın amacı LBP (Aşağı Bel Ağrısı)'nin masa tenisi veya futbol sporcularında ve sporcu olmayan kişilerde ortaya çıktığı durumları ve farklılıklarını araştırmaktı. Bu araştırmayı gerçekleştirmek için yaş ortalaması 19.4 olan ve LBP saptanan 90 kişi seçildi ve masa tenisçi, futbolcu ve kontrol olarak 30'arlık üç gruba ayrıldı. Sonuçlara göre masa

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tenisçilerin % 60'ının LBP sebebi spondilolizis idi. Futbolcularda bu durum % 30 gibi daha düşük bir oranda ortaya çıktı. Sporcu olmayan kontrol grubunda ise spondilolizis oranı sadece iki denek (% 6.7) ile sınırlı kaldı. Futbolcularda daha kısa bir reaktivasyon süresi gözlendi. Masa tenisçiler ile futbolculardaki semptomlar farklılık göstermekte idi. Masa tenisçilerde tekrarlayan ve progresif semptomlar gözlenirken, futbolcularda akut semptomlarla karşılaşıldı. Bu çalışma aracılığında, uygulanmakta olan sporun doğasında var olan yaralanmalar ile sporcularda LBP'nin ortaya çıkışı arasındaki ilişki ortaya konmaya çalışılmaktadır.

Anahtar sözcükler: *Aşağı bel ağrısı, spondilolizis, masa tenisi, futbol, egzersiz*

INTRODUCTION

Low Back Pain (LBP) is considered to be associated to multi-factorial etiology, in general. Traumas at the level of posterior lumbar ligaments, vertebral bodies, articular surfaces, muscles, neurons and foramens, as well as congenital dysphasias, inflammatory and degenerative diseases of the lumbar spine, are commonest causative factors of LBP in the general population (1,7,8,11).

Mechanical forces that are applied to the lumbar spine are very particular in tennis. Due to the high frequency of torsional stresses to the lumbar spine, the incidence of LBP is high. The special characteristics of tennis include high velocity and frequency of lumbar spine torsional movements that produce mechanical fatigue and failure of the supportive structures of the lumbar functional units, and the glioelastic prophylactic properties of the intervertebral discs and ligaments (6). The quick change of movement from flexion-extension to alternative torsion against weak lumbar muscles and ligaments also produces continuous stress to these soft structures, resulting in multiple microtrauma and injury that follows (5,7,11,16). Consequently, tennis players display higher risk of soft lumbar structure injury due to the continuous flectional and torsional movements they submit their lumbar spine. Chronic degenerative lumbar diseases and vertebral stenosis due to intervertebral disc prolapsus are other predisposing factors. Muscle contusion is also quite common in tennis players. Marks et al. (13), in a study that included 148 tennis players, observed that 38 % had lost at least one match due to LBP. In this study, 43 athletes suffered from chronic lumbar pain and 38 suffered from some kind of acute injury of the lumbar spine during the competitive period.

Conclusively, the lumbar part of the vertebral column is prone to injuries in many sports (21). Various research deals with the frequency, clinical results and etiology of LBP in athletes (20,21,22). The purpose of the present study is to investigate the different reasons of LBP incidence in athletes that participate in table tennis and football, and to compare them with non-athletes suffering from LBP.

MATERIAL AND METHODS

For this research, 90 individuals were chosen from populations of athletes and non-athletes, who sought medical assistance due to Low Back Pain in the period of 2000-2003. They were categorized into 30 table-tennis players (Group A), 30 football players (group B), and 30 persons with no athletic activity of any kind (group C: control group). Subjects in each group were selected in such a way that there was an age match (mean age of 19.4 ± 1.5 yrs).

A full medical history record of every person tested was taken initially. The level of athletic activity was given in hours per week for the last six months. Also, the subjective pain felt by each person tested was recorded in a scale of 1 to 10. All this information was included in a questionnaire based on international standards that was modified according to the needs of the research performed by the Laboratory of Functional Anatomy and Sports Medicine, Department of Physical Education and Sport Science, University of Athens.

All the testers were subjected to full medical examination by orthopedics specialists of our research team. Detailed records of: a) any possible lumbar muscles' spasm, b) control of posture, lumbar movements and possible deviations of the vertebral column, c) examination of pain felt in the sciatic nerve root by the SLR method, and d) full neurological control of lower limbs including sensory innervation checking, muscle strength and joint reflexes, were taken. All persons tested were submitted to radiological control of the vertebral column by X-rays (anteroposterior, lateral and oblique views). CTI and MRI were used only where necessary.

Therapeutic modalities depended on the diagnosis and included bed rest, conservative therapy with anti-inflammatory and muscle relaxant drugs, and physiotherapy especially in the rehabilitation period. Lastly, the time period that each tester needed to improve his condition and resume athletic activity was recorded in detail.

RESULTS

The main result in group A is that 18 athletes out of 30 (60 %) were diagnosed to have spondylolysis. Radiological findings reported 18 athletes to have scoliosis, 13 of whom had spondylolysis as well. In six athletes, diminished lumbar lordosis was present, and four of the latter had spondylolysis as well. In the remaining subjects of group A, minimal lumbar spine problems were found, such as plain muscle contusion and small degree of degenerative spondyloarthrosis.

In group B, nine football players appeared to have spondylolysis (30 %), and nine athletes had scoliosis, and two had decreased lumbar spine lordosis. In this group, there was no overlap of two different diagnoses in the same athlete as it occurred in group A. The remaining football players had minimal lumbar spine problems, such as plain muscle contusion. In three athletes, there was no official diagnosis of the low back pain felt.

In the non-athlete control group, 11 were diagnosed with scoliosis, seven with spina bifida, and only two cases with radiological and clinical results of spondylolysis. In the remaining subjects of the control group, the etiology of low back pain remained unknown, since clinical and radiological results did not match with those of any known disease of the lumbar spine. Physical findings of the subjects are given in Table1.

Table 1. Physical findings of subjects.

	Table tennis N=30	Football N=30	Non-athletes N=30
Spondylolysis	n=18 60 %	n=9 30 %	n=2 7 %
Scoliosis	n=18 60 %	n=9 30 %	n=11 37 %
Decreased lumbar curve	n=6 20 %	n=2 7 %	-
Spina bifida	-	-	n=7 23 %

As far as the intensity of the pain felt is concerned, recorded on a scale of 1 to 10, the mean value of each group was calculated. In group A the mean value of the intensity of pain due to low back pain was 4.5, in football players 5.0, and in the control group 3.9. At this point, it is important to note the fact that in the first two groups of athletes, there

was no large deviation of the individual pain felt from the mean value, while in the control group, the spectrum of pain intensity score was quite broad, between 3 to 7.

However, the most important result of our research appears to be the fact that the modality of pain initiation is very different in the three groups of subjects with low back pain. Of the table tennis athletes, 21 (70 %) expressed clearly that the pain was increasing gradually, while 19 declared that the first attack of pain was felt in the pubertal years but was ignored. On the other hand, the vast majority of football players (73 %) declared that they had felt pain in the region of the lumbar spine in a first given occasion, and all of them associated the pain felt with an incidence of falling or a sudden movement (Table 2).

Table 2. Quality and intensity of pain.

	Table tennis N=30	Football N=30	Non-athletes N=30
Intensity of LBP (average)	4.5	5.0	3.9
- Slow progressive onset - Without an accident or definable event - Repeatedly	n=21 (71 %)	n=8 (27 %)	n=7 (23 %)
- Sudden onset of LBP - Understandable cause - Temporary pain	n=9 (30 %)	n=22 (73 %)	n=23 (77 %)

Lastly, return to athletic activity was not the same in the three groups. Athletes who did not have spondylolysis resumed athletic activity in the first two weeks. Football players with spondylolysis returned to athletic activity in the 4th week with no relapse of the symptoms. Of the table tennis players with spondylolysis, eight resumed athletic activity in the 5th week with no relapse of the symptoms, three returned to athletic activity in the 6th week with no relapse of the symptoms as well, while seven table tennis players with spondylolysis had relapse of low back pain symptoms a week following the day they returned to athletic activity (Table 3).

Table 3. Time to resume athletic activity.

Weeks to resume activity	1st	2nd	3rd	4th	5th	6th
Table tennis players (N=30)	-	n=12	-	-	n=8	n=10
Football players (N=30)	-	n=21	-	n=9	-	-

DISCUSSION

It is estimated that approximately 80 % of the population worldwide has suffered from LBP at least once in their lifetime (2). The incidence of LBP is common in sedentary individuals as well as in persons who practice sport regularly. There are several cases of internationally distinct athletes reported to have abandoned professional athletic career due to LBP (7,13). The incidence of LBP is more common in sports that put a strain on the vertebral column. Especially sports like weight lifting that produce vertical stresses on the vertebral column, or sports like tennis, golf, ice skating, gymnastics, throwing events that cause extreme flexion, extension and torsion movements of the lumbar spine or sports that require high energy contact with the opponent such as rugby, hockey and football, display a higher incidence of LBP (2,7,13).

Sward et al. (19) clinically examined 142 high-competitive level athletes 14 - 25 years old, who practiced wrestling, gymnastics, football and tennis. They found that the incidence of LBP was considerably high (50-85 %) and in 36-55 % of those athletes, X-ray findings were also present. In this study, LBP was associated with intervertebral disc stenosis, Schmorls nodules and changes in the configuration of vertebral bodies. The prevalence of pain was higher than that encountered in the general population. This was probably due to the fact that athletes are submitted to higher regular stresses and contacts than non-athletes did not (2,12,19).

Our observations are comparable with various sports. Especially in the case of weight lifting, in the position where the athlete holds a considerable amount of weight over his head increases the physiological lumbar lordosis, and consequently leading to spondylolysis and spondylolysthesis cases estimated to be between 30-37 % in this particular sport (14,17). In American football, 30 % of the players are reported to have missed some time of the competitive period due to LBP (21). Other etiological factors of LBP in this particular sport are the forceful torsion and the extreme flexion-extension of the lumbar spine that result in stress fracture (13,18). The incidence of spondylolysis in gymnastics was found to be 2-11 % (10).

The results of our research support the belief that the incidence of spondylolysis in the general population is quite small, approximately 6 %, while in athletes it may reach 60 %, and most of the times it is accompanied by resistant LBP (4,19).

The analysis of our research results leads us to the conclusion that sports like table tennis should be included in the category of sports with a high risk factor for developing LBP. This is due to the fact that from the technical point of view, the table tennis player is forced to continuous and abrupt rotational and lateral flexion movements of the lumbar spine.

However, we could not evaluate the percentage of table tennis players with asymptomatic spondylolysis, since we examined in this research athletes with LBP exclusively. On the other hand, the figure of 60 % symptomatic spondylolysis leads us to the conclusion that spondylolysis should be a major etiological factor of LBP in table tennis.

Another interesting observation of our research is the presence of cases of athletes with spondylolysis and scoliosis. The etiology of LBP was not clear in these athletes, and future research on these cases will probably clarify the relation between spondylolysis and scoliosis in table tennis athletes (9).

As far as the intensity of pain is concerned, the fact that the level of pain felt in the two athlete groups did not match the deviations encountered in the sedentary control group with LBP, is quite interesting. However, it must be noted that the questionnaires were filled by the testers themselves, resulting in considerable subjectivism.

The most interesting result seems to be the one concerning the onset of LBP. In table tennis players, the first attack was clearly documented to be in the pubertal age (14-16 yrs old). This reinforces the conclusion of researchers who reported that young athletes who deal with sports of high risk for diseases of the lumbar spine are to be considered a special category of athletes, in whom care and measures should be taken to prevent injuries of the lumbar spine. The key point in this field is to emphasize the first symptom, and to diagnose and deal with a possible injury at that given time, and to consequently reduce the high incidence of LBP in adult athletes.

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